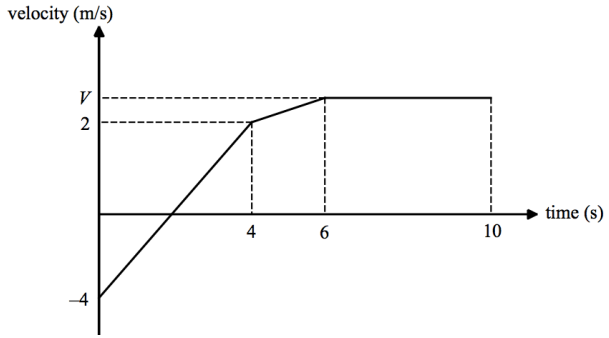
AS Level
Maths

Bronze Set A, Paper 2 (Edexcel version)

Question	Solution	Partial Marks	Guidance
1 (a)	$10 = 12\overline{x} - 6$ $\Rightarrow \overline{x} = \frac{10+6}{12} = \frac{4}{3}$	M1 A1 **[2]**	Substitutes 10 for y into a correct equation. Allow for use of any letter or expression for the mean. Correct mean. Answer only is 2/2.
1 (b)	Standard deviation = $12(2.34) = 28.08$	M1 A1 **[2]**	Substitutes 2.34 for x and ignoring the –6. Allow for use of any letter or expression for the standard deviation. Correct standard deviation. Answer only is 2/2.
2 (a)	**The large data set contains data for May-October**, so the month (of lowest temperature) is likely to be **October**	B1 **[1]**	Suggests October and states that the LDS has data for October. **Accept candidates that suggest May based on the same logic.** [SC B1 if candidates suggest, with reason, both May and October.]
2 (b)	*idea that* data on temperature in LDS is (also) given to 1 dp (so this is consistent with the data)	B1 **[1]**	Idea that data on temperature in the LDS is (also) given to 1 dp
2 (c)	Give each data point a unique number, generate a list of random numbers and pick data points corresponding to the random numbers until a sample of size 38 has been obtained Any repeats (in random numbers) are ignored	B1 B1 **[2]**	For all three points conveyed at some point in the answer. Allow equivalent formulations of the points Explains how repeats are dealt with. This must be in relation to random numbers, so the statement 'any repeats are ignored' **alone** is B0, but the statement 'any repeats are ignored' in an answer that has mentioned/implied use of random numbers is B1.
2 (d)	5.4473…	B1 **[1]**	Correct mean. Awrt 5.45
2 (e)	2.2326… Oktas	B1 B1 **[2]**	Correct standard deviation. Awrt 2.23. **Accept awrt 2.14** Correct units

2 (f)	*idea that* only looked at Leuchars for weather information about England / only looked at weather information in 2015 and not 1987	B1 **[1]**	Suitable limitation
2 (g)	*idea that* the large data set only has data on four countries/ / the large data set only has data for 1987 and 2015 / May-October / Alex is not able to get representative world data from solely the large data set	B1 **[1]**	For conveying any suitable limitation of the scope of the large data set
3	Let X be the number of disconnected calls from 200 calls, then $X \sim B(200, 0.03)$ $H_0 : p = 0.03$, $H_1 : p < 0.03$ $P(X \leq 4 \mid X \sim B(200,0.03) = 0.281...$ Reject H_1 or insignificant or 4 lies outside critical region There is insufficient evidence to suggest that the manager's meeting was effective / the number of calls that are disconnected has been reduced	B1 B1 M1 A1 ft A1 **[5]**	Uses correct binomial model, seen or implied Explicitly states H_0 and H_1 Attempts to find P($X \leq 4$) or uses a method to find the critical region (trial and error is a suitable method). CR is $X \leq 2$, $X \geq 9$. No need for candidates to investigate upper CR Statement ft their 0.281… or critical region Fully correct hypotheses test completed by a conclusion in context
4 (a)	Data is continuous	B1 **[1]**	Justification
4 (b)	Area (of the bars) is proportional to the frequency	B1 **[1]**	Correct feature
4 (c)	Width is 3 cm $\frac{40}{8} = \frac{80}{3h} \Rightarrow h = \frac{16}{3}$ cm	B1 M1 A1 **[3]**	Correct width Correct method to find height using area prop. to frequency Correct height

4 (d)	$\frac{8}{40}=\frac{1}{5}\Rightarrow$ 1 person per 0.2 cm^2 52/0.2 = 260 people Total money raised is approximately 260×102 = £26520	M1 M1 A1 **[3]**	Complete method to find total number of people in the competition Their total number of people × 102 Correct estimate
5	$\frac{(-1)^2+1}{k}+\frac{0^2+1}{k}+\frac{1^2+1}{k}+\frac{2^2+1}{k}=1$ $\Rightarrow k=10$ $P(-3<2X-1\le 2)=P\left(-1<X\le\frac{3}{2}\right)$ $=\frac{1}{10}+\frac{2}{10}$ $=\frac{3}{10}$	M1* M1**(dep*) M1(dep**) A1 **[4]**	Method to find the value of k Attempts to identify the values of X that are of interest Correct method to find probability of their $P(-1 < X \le 3/2)$ using their k Correct probability
6 (a)		B1 B1 **[2]**	Correct shape. Condone line segment between $4 \le t \le 6$ to be steeper than the line segment between $0 \le t \le 4$ Correct velocities labelled
6 (b)	Acceleration is $\frac{2--4}{4}=\frac{3}{2}$ m s^{-2}	B1 **[1]**	Correct acceleration oe

6 (c)	$v = u + at \Rightarrow 0 = -4 + \frac{3}{2}t$ So $t = \frac{8}{3}$ s	M1 A1 **[2]**	Correct method to find time where the particle is at rest. Candidates can use a kinematics formula or may use a geometrical approach, i.e. similar triangles Correct value of t
6 (d)	$-\frac{1}{2}(4)\left(\frac{8}{3}\right)+\frac{1}{2}\left(4-\frac{8}{3}\right)(2)+\frac{1}{2}(2+V)(2)+4V=13$ $\Rightarrow -\frac{16}{3}+\frac{4}{3}+2+V+4V=13$ $\Rightarrow 5V=15$ $\Rightarrow V=3$	M1 A1 A1 **[3]**	Method to find total (signed) area under the curve and equate to 13. Condone ± for first term for the M1. Correct unsimplified expression Correct value of V.
7 (a)	$b = 4$ Displacement of particle is $s = \int v\,dt = \frac{1}{3}at^3 + 4t \quad (+k)$ In third second, displacement is 61 m so $61 = \frac{1}{3}a(3)^3 + 4(3) - \frac{1}{3}a(2)^3 - 4(2)$ $\Rightarrow a = \frac{3(61-12+8)}{3^3-2^3} = 9$	B1 M1* M1(dep*) A1 **[4]**	Correct value of b Attempts to integrate expression for v wrt t to find an expression for s Uses information in question to set up an equation. Must substitute correct limits into the equation and in the correct order Correct value of a
7 (b)	Acceleration at $t = 4$ is $2(9)(4) = 72$ m s^{-2} So $F = ma \Rightarrow 10 = 72m \Rightarrow m = \frac{10}{72}$ kg	M1 A1 **[2]**	Method to find acceleration of the particle at $t = 4$ using their a Correct mass of the particle
8 (a)	Speed = $\sqrt{4^2 + (-6)^2} = 2\sqrt{13}$ m s^{-1}	B1 **[1]**	Correct speed of B_1. Accept equivalent forms. Decimal equivalents must be given to at least two significant figures.

8 (b)	$\tan^{-1}\left(\frac{6}{4}\right) = 56.309...$ Bearing = 90 + 56.309… = 146	M1 A1 **[2]**	Computes $\tan^{-1}\left(\frac{6}{4}\right)$ or $\tan^{-1}\left(\frac{4}{6}\right)$ Correct bearing
8 (c)	$s = (4\mathbf{i} - 6\mathbf{j})t$	B1 **[1]**	Accept equivalent forms, i.e. $s = (4t)\mathbf{i} - (6t)\mathbf{j}$, or t out front. Accept other letters or expressions for the displacement or no letter at all, e.g. $(4t)\mathbf{i} - (6t)\mathbf{j}$ alone is OK
8 (d)	$4t = 2 \Rightarrow t = \frac{1}{2}$ $-6t = 3 - 4t$ $\Rightarrow -2t = 3$ $\Rightarrow t = -\frac{3}{2} \neq \frac{1}{2}$ so the boats do not meet	M1* M1(dep*) A1 **[3]**	Equates one of the components and solves for t Equates a second component and solves for t OR substitutes the t obtained from equating the first components into the second components Convincing proof with sufficient argument. $-3/2 \neq 1/2$ is sufficient argument.
9 (a)	The string is inextensible	B1 **[1]**	Correct reason
9 (b)	Applying N2L on Q gives $4mg - T = 4m(0.7g)$ So $T = 1.2mg$	M1 A1 **[2]**	Applies N2L on Q: must have the correct number of terms and be dimensionally correct. Correct tension
9 (c)	Applying N2L to P: $'1.2mg' - \mu(mg) = m(0.7g)$ So $\mu = 0.5$	M1 B1 A1 **[3]**	Applies N2L to P: correct no. of terms, dimensionally correct eq Frictional force = $\mu \times$ their normal reaction Obtains correct answer

9 (d)	Resultant force is $\sqrt{T^2+T^2} = T\sqrt{2} = \frac{6\sqrt{2}}{5}mg$ Direction is 45 degrees to the horizontal, away from table	M1 A1 B1 **[3]**	Correct method to find resultant force using Pythagoras Correct resultant force Correct direction stated clearly. Accept correct direction shown on a diagram